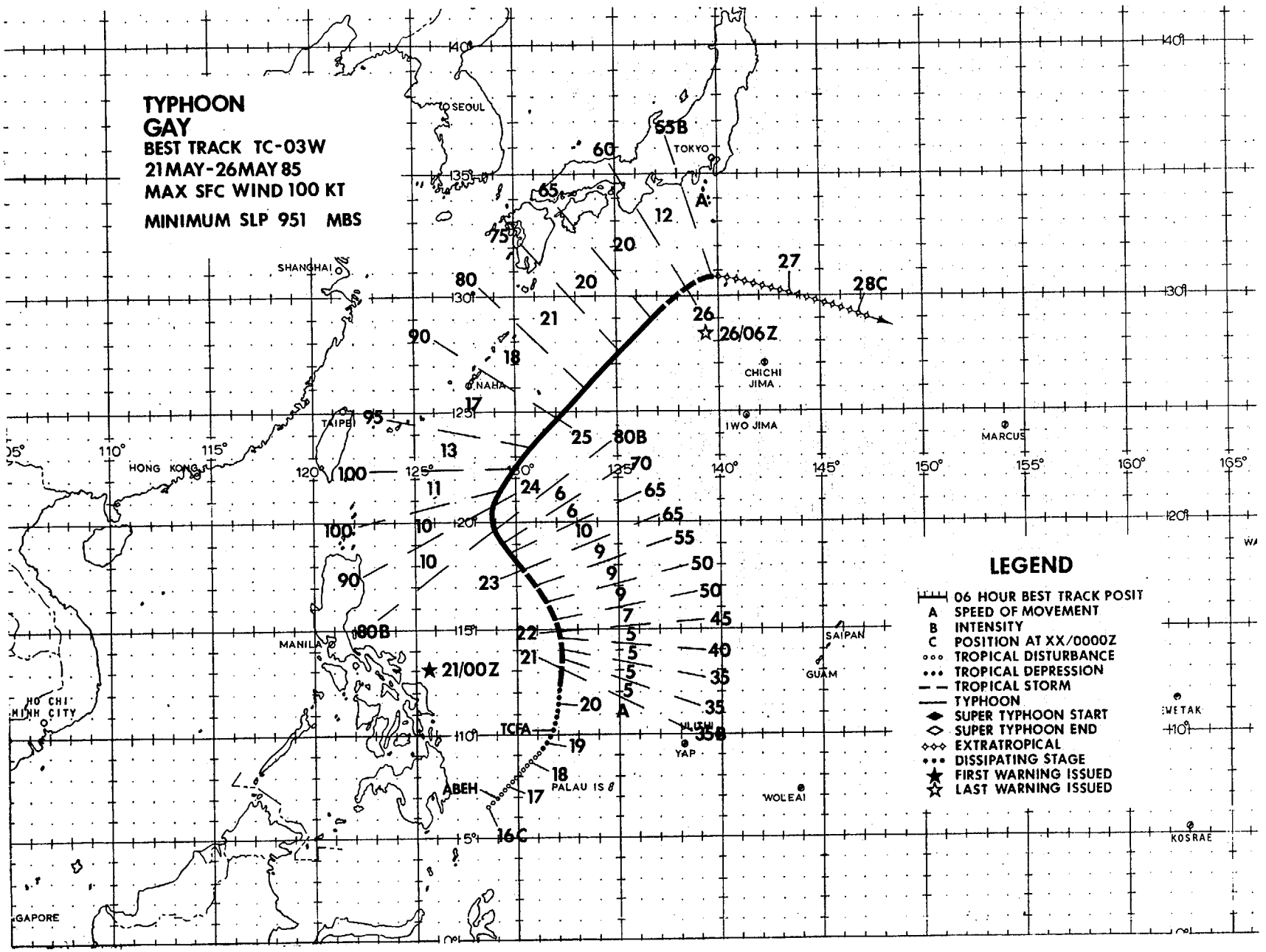
TYPHOON
GAY
BEST TRACK TC-03W
21MAY-26MAY 85
MAX SFC WIND 100 KT
MINIMUM SLP 951 MBS
TO SEOUL
TOKYO
SHANGHAI
NAHA
TAIPEI
HONG KONG
MANILA
HO CHI MINH CITY
GAPORE
CHICHI JIMA
IWO JIMA
MARCUS
SAIPAN
GUAM
YAP
WOLEAI
PALAU IS
ABEH
TCFA
WETAK
KOSRAE
★ 21/00Z
☆ 26/06Z
LEGEND
06 HOUR BEST TRACK POSIT
A SPEED OF MOVEMENT
B INTENSITY
C POSITION AT XX/0000Z
TROPICAL DISTURBANCE
TROPICAL DEPRESSION
TROPICAL STORM
TYPHOON
SUPER TYPHOON START
SUPER TYPHOON END
EXTRATROPICAL
DISSIPATING STAGE
FIRST WARNING ISSUED
LAST WARNING ISSUED

Typhoon Gay was the first tropical cyclone to reach typhoon intensity in 1985. It was also the season's first to enter the mid-latitude westerlies and recurve. The formation of Gay followed more than four months of inactivity in WESTPAC and marked the start of the 1985 summer tropical cyclone season.

The tropical disturbance that eventually intensified into Typhoon Gay was first detected by synoptic data on 16 May as a weak surface circulation 380 nm (704 km) west-southwest of Koror (WMO 91408). The convection in this area appeared to be random. Another area of disorganized convection was developing further east along 139E under an area of upper-level diffluence associated with a westward moving upper-level anticyclone. To the north, a tropical upper-tropospheric trough (TUTT) extended from the Volcano Islands southwest to just east of the Philippines. Figure 3-03-1 shows the movements and locations of the upper-level anticyclonic and low-level cyclonic circulations over a five day period as Gay went through its formative stages. Although the upper-level and low-level circulations became nearly vertically aligned on 19 May, the disturbance still struggled for two more days before reaching tropical storm intensity. The most probable cause for this slow intensification was the close proximity of the TUTT to the north, which restricted the upper-level outflow to the northwest (Figure 3-03-2).

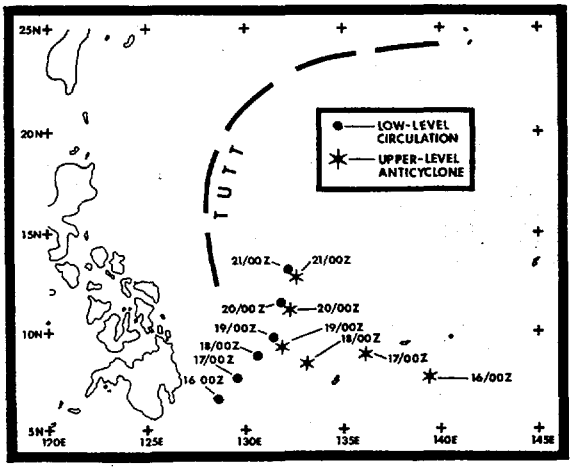

Figure 3-03-1. These plots show the positions and movements of the upper-level anticyclonic and low-level cyclonic circulations during Gay's formative period. The juxtaposition of these upper- and low-level circulations on 19 May usually indicates the tropical cyclone is reaching maturity. However, the presence of the TUTT to the north and northwest is thought to have impeded development through the 21st.

Between 0000Z and 0600Z on the 19th two different tactical DMSP sites, based upon Dvorak intensity analyses of satellite imagery, estimated that the disturbance had 30 kt (15 m/s) surface winds. These increased intensity estimates were founded on the more organized intense convection associated with the upper-level circulation center, which was then displaced approximately 50 nm (93 km) southeast of the surface center. These satellite reconnaissance inputs prompted a TCFA to be issued at 190800Z. At the time of the TCFA, sparse synoptic data near the disturbance center could not confirm the satellite derived intensities. However, synoptic data on the periphery of the disturbance implied that at least a 15 kt (8 m/s) circulation was present. Until this time, the only reported stronger wind was the gradient-level wind at Koror (WMO 91408) which increased from 9 kt (5 m/s) at 171200Z to 27 kt (14 m/s) at 180000Z as the disturbance passed west of the island late on the 17th. For the remainder of the 19th and into the 20th, with the TUTT continuing to exert influence on the disturbance, there was no significant improvement in the tropical cyclone's organization. As a result, the TCFA was reissued at 200700Z.

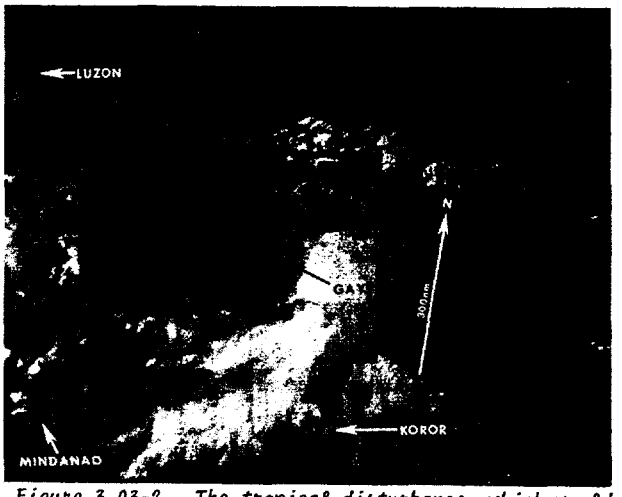

Figure 3-03-2. The tropical disturbance, which would later develop into Typhoon Gay, is interacting with the upper-level trough to the northwest. The outflow is restricted on the northwest side of the tropical cyclone (200518Z May NOAA visual imagery).

The first warning on Gay was issued at 210000Z after visual satellite imagery showed the convection was developing over the low-level circulation and Dvorak intensity analysis estimated that 35 kt (18 m/s) surface winds were present. The presence of the upper-level trough and its restrictive influence on outflow aloft strongly influenced the intensity forecasts on the first nine JTWC warnings. Gay was expected to strengthen only slowly, then maintain

intensity or weaken slightly in the extended outlook periods. These scenarios appeared valid based on satellite derived intensity analyses and forecasts, and on expectations that the upper-level trough would persist. Post-analysis revealed these intensities were consistently low. This was primarily due to the lack of any aircraft reconnaissance or synoptic data confirming the intensity, and partially due to the TUTT weakening faster than expected.

Gay attained typhoon intensity at about 230000Z just prior to the first aircraft reconnaissance penetration at 230830Z. The Aerial Reconnaissance Weather Officer (ARWO) reported Gay as very compact, with 65 kt (33 m/s) surface winds surrounding a 15 nm (28 km) diameter eye, and a 971 mb minimum sea-level pressure (MSLP). Gay's intensification to typhoon strength can be attributed to the significant weakening of the TUTT on the 22nd and to its tight circulation. In this case, the Typhoon's small size allowed it to mature in an area where a larger circulation would have interacted unfavorably with the surrounding atmosphere. Consequently, Gay became vertically stacked and developed a ragged eye while moving northwest with the mid-level steering flow around the western periphery of the subtropical ridge. This set the stage for Typhoon Gay's final phase.

By 230000Z, with a frontal boundary and associated mid-latitude trough quasi-stationary across the Ryukyu Islands, a recurvature scenario seemed most probable. JTWC incorporated this into the warnings and called for recurvature along the subtropical ridge axis near 22N in 48 hours. This scenario was ahead of all forecast aids (Figure 3-03-3), especially the OTCM (One-way Interactive Tropical Cyclone Model), JTWC's best forecast aid. With Gay continuing to intensify and move northwest, Kadena AB (WMO 47931) set Condition of Readiness III at 232230Z. Fortunately, Gay came under the influence of the mid-latitude westerlies and recurved earlier than forecast passing well south of Okinawa. Just prior to Gay's recurvature, another mid-latitude mid-level trough began to dig unseasonably southward across eastern China northwest of Gay. This apparently increased the upper-level outflow ahead of the trough and may be the reason why Gay continued to intensify for 6 to 12 hours after recurvature. Gay reached a peak intensity of 100 kt (51 m/s) between 240600Z and 241200Z (Figure 3-03-4). This intensification correlates well with the studies by Riehl (1972) and Guard (1983) on the intensification of recurving tropical cyclones in WESTPAC.

After recurvature, Gay started a gradual acceleration to the northeast with satellite imagery indicating interaction with the frontal boundary beginning at 241200Z. By 0600Z on the 25th, Gay was entraining modified polar air into the low-level circulation and the eyewall was disintegrating. Extratropical transition had begun and the intense central convection started displacing outward. A steady decrease in convective organization and intensity continued as the mid-latitude trough moved rapidly eastward from the Yellow Sea over Japan. Gay was downgraded to a Tropical Storm at 260000Z.

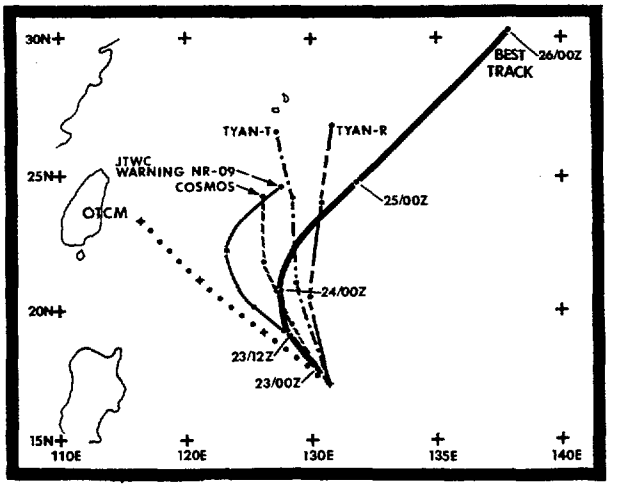

Figure 3-03-3. These plotted forecast aids were available to the Typhoon Duty Officer (TDO) at the time the first recurvature forecast was issued. OTCM, JTWC's best aid, failed to predict the recurvature. OTCM guidance repeatedly failed to forecast recurvature, in this case, until after it had actually occurred!

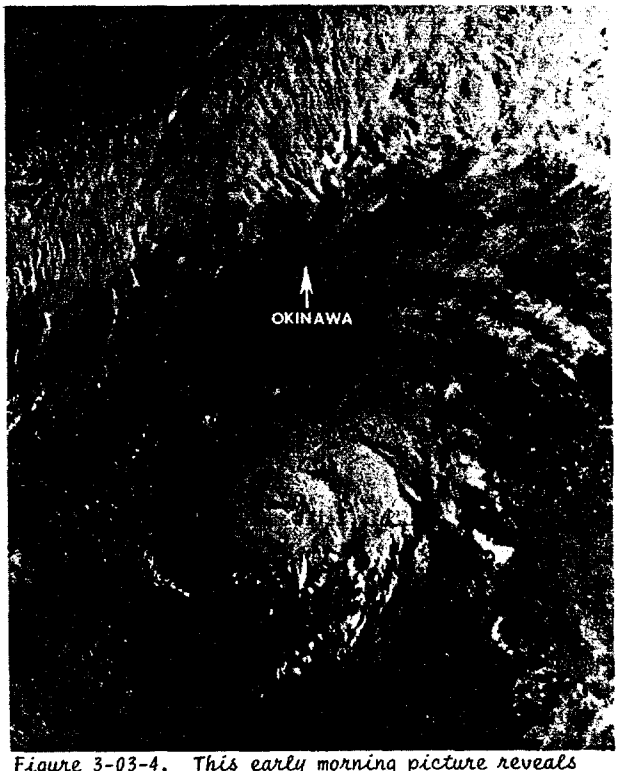

Figure 3-03-4. This early morning picture reveals Typhoon Gay near maximum intensity. (Note Gay's developing eye). The proximity of the frontal boundary to the north led to a recurvature forecast, overruling the the incorrect guidance from the forecast aids (232127Z May DMSP visual imagery).

Figure 3-03-5 shows the effect of the strong vertical wind shear on the remaining convection from the storm's circulation. Gay completed extratropical transition at 260600Z when the final warning was issued.

After completing extratropical transition, the nearly convection free low-level circulation drifted eastward and eventually dissipated. There were no reports of lives lost or damage to shipping from Typhoon Gay.

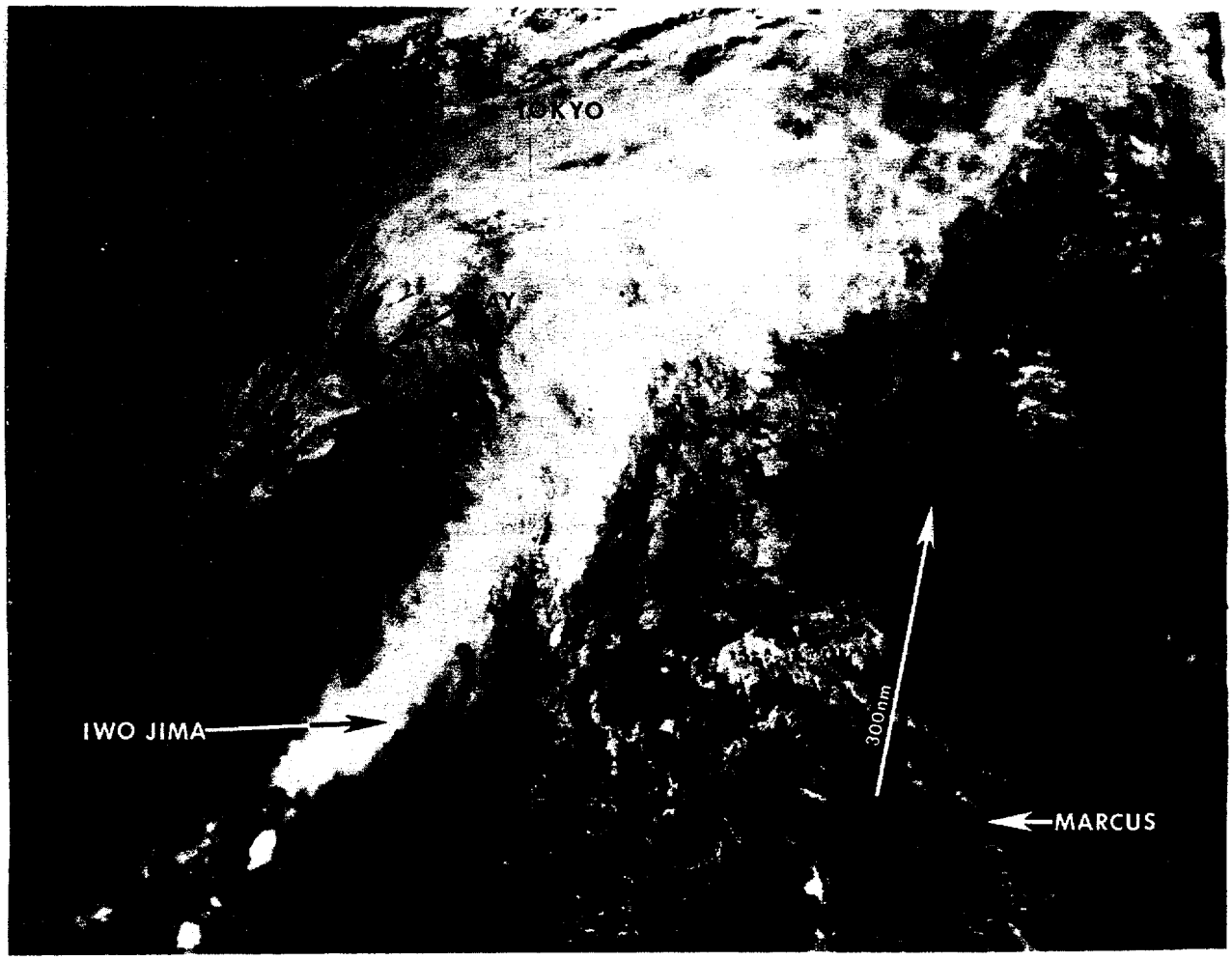

Figure 3-03-5. As Gay completes extratropical transition, the upper-level westerlies are shearing the convection away to the northeast of the low-level circulation center (260413Z May NOAA visual imagery).